

CLAIMS

1. A method for the encapsulation of uranium metal which comprises treating the metal with an encapsulant which comprises a cementitious material and curing said cementitious material, wherein said process additionally comprises the provision of means for the minimisation of the corrosion of said metal.
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2. A method as claimed in claim 1 wherein said uranium metal is comprised in waste material.
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3. A method as claimed in claim 1 or 2 wherein said means for the minimisation of the corrosion of said metal comprises means for the prevention of the corrosion of said metal.
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4. A method as claimed in claim 1, 2 or 3 wherein the mode for the provision of said means for the minimisation of corrosion comprises the provision of a source of oxygen within the cement matrix.
- 20 5. A method as claimed in claim 4 wherein the provision of said source of oxygen within the cement matrix comprises facilitating enhanced oxygen access from the atmosphere.
- 25 6. A method as claimed in claim 4 wherein the provision of said source of oxygen within the cement matrix comprises the inclusion of an independent source of oxygen.
7. A method as claimed in claim 1, 2 or 3 wherein the mode for the provision of said means for the minimisation of corrosion comprises facilitating the minimisation of the water content of the matrix.
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8. A method as claimed in claim 5 wherein enhancement of oxygen access from the atmosphere is achieved by the incorporation of at least one air entraining agent in the cementitious material.
- 5 9. A method as claimed in claim 8 wherein said air entraining agent comprises at least one anionic or non-ionic surfactant.
10. A method as claimed in claim 8 or 9 wherein said cementitious material comprises 0.01-2% (w/w) of an air-entraining agent.
- 10 11. A method as claimed in claim 5 wherein enhancement of oxygen access from the atmosphere is achieved by the incorporation of cenospheres in the cementitious material.
- 15 12. A method as claimed in claim 11 wherein said cementitious material comprises 0.01-30% (w/w) of cenospheres.
13. A method as claimed in claim 6 wherein said independent source of oxygen comprises at least one peroxide.
- 20 14. A method as claimed in claim 13 wherein said peroxide comprises an inorganic peroxide.
15. A method as claimed in claim 14 wherein said inorganic peroxide comprises
- 25 a peroxide of a metal from Group II of the Periodic Table.
16. A method as claimed in claim 15 wherein said peroxide comprises calcium peroxide or magnesium peroxide.
- 30 17. A method as claimed in any one of claims 13 to 16 wherein said cementitious material comprises 0.01-10% (w/w) peroxide.

18. A method as claimed in claim 7 wherein the means for facilitating the minimisation of the water content of the matrix comprises the addition of at least one superplasticiser to the cementitious material.
- 5 19. A method as claimed in claim 15 wherein said at least one superplasticiser comprises at least one surfactant.
20. A method as claimed in claim 19 wherein said surfactant comprises a polyacrylate or polycarboxylate.
- 10 21. A method as claimed in claim 18, 19 or 20 wherein said cementitious material comprises 0.01-5% (w/w) of superplasticiser.
- 15 22. A method as claimed in any one of claims 1 to 21 wherein said cementitious material comprises Portland Cement.
23. A method as claimed in any preceding claim wherein the cementitious material additionally comprises one or more fillers.
- 20 24. A method as claimed in claim 23 wherein said filler is selected from pulverised fuel ash, finely divided silica and organic and inorganic fluidising agents.
- 25 25. A method as claimed in any preceding claim wherein the cementitious material is provided in the form of an aqueous composition.
26. A method as claimed in claim 25 wherein the water content of the composition is in the region of 30-50% (w/w).
- 30 27. A method as claimed in claim 25 wherein the water content of the composition is in the region of 10-50% (w/w).

28. A method as claimed in any preceding claim wherein the uranium metal is placed in an appropriate container and a cementitious material is added and allowed to at least partially cure.

5 29. A method as claimed in claim 28 wherein the container is subsequently capped.

30. A method as claimed in claim 28 or 29 wherein the container comprises a drum having a capacity in the region of 500 litres.

10 31. A method as claimed in any preceding claim which comprises mixing of said cementitious material with said means for the minimisation of the corrosion of said metal.

15 32. A method as claimed in claim 31 wherein said mixing is effected in the container into which the uranium metal is placed.

33. A method as claimed in claim 31 wherein said mixing is carried out externally to the said container.

20 34. A method as claimed in claim 33 wherein said mixing is performed in a batchwise fashion prior to addition of the cementitious material to the container.

25 35. A method as claimed in claim 33 wherein said mixing takes place in-line prior to the introduction of the cementitious material into the container.

30 36. A method for the storage of uranium metal which comprises encapsulation of the material in a cured cementitious material comprising means for the minimisation of the corrosion of said metal.